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CLAIMS

1. A recombinant phytase having modified phytase activity said recombinant phytase comprising a modification selected from the group of modifications consisting of
  - i) a modification of at least one amino acid residue(s) corresponding to residue(s) 26, 43, 46, 54, 73, 113, 126, 184, 228, 384 or 410 of a mature E. Coli phytase designated EBC18B2 of Figure 12;
  - ii) a modification of at least one amino acid residue located within 5 residues either upstream or downstream in linear sequence from the amino acid residue(s) corresponding to residue(s) 26, 43, 46, 54, 73, 113, 126, 184, 228, 384 or 410 of a mature E. Coli phytase designated EBC18B2 of Figure 12; and
  - iii) a modification of at least one amino acid residue which has its alpha carbon located within 6 Å of the alpha carbon of amino acid residues selected group of residue(s) corresponding to residue(s) 26, 43, 46, 54, 73, 113, 126, 184, 228, 384 or 410 of a mature E. Coli phytase designated EBC18B2 of Figure 12. (Please indicate any others residues).
- 1A. The recombinant phytase of claim 1, wherein said modification includes at least two of said modifications.
2. The recombinant phytase of claim 1, wherein said modification is a substitution.
3. A polynucleotide sequence encoding said recombinant AppA phytase of Claim 1, further comprising a secretion signal sequence operable in a *Bacillus* species.
4. An expression construct comprising a sequence encoding the phytase of Claim 1, further comprising the signal secretion sequence of Claim 3.
5. A vector comprising the expression construct of Claim 4.
6. A host cell transformed with the vector of Claim 5.

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7. The host cell of Claim 6, wherein said cell is a *Bacillus* species.
8. The host cell of Claim 7, wherein said cell is a *Bacillus subtilis*.
9. A method of producing an enzyme having modified phytase activity comprising:
  - a) providing a host cell transformed with the expression construct of Claim 4;  
and
  - b) culturing said host cell under conditions suitable for said cell to produce said phytase.
10. The method of Claim 9, further comprising:
  - c) recovering said phytase.
11. The method of Claim 9, wherein said host cell is a *Bacillus* species.
12. The method of Claim 11, wherein said host cell is a *Bacillus subtilis*.
13. A method of producing said recombinant phytase of Claim 1 having modified activity, said method comprising:
  - a) providing a nucleic acid comprising a sequence encoding an AppA phytase or encoding a natural variant thereof;
  - b) subjecting said nucleic acid to error-prone amplification;
  - c) transforming a host cell with an expression construct comprising a product of said amplification; and
  - d) culturing said host cell under conditions suitable for said cell to express said amplification product.
14. The method of Claim 13, wherein said host cell is *Bacillus subtilis*.
15. The method of Claim 13, further comprising:
  - e) recovering said phytase.

16. The recombinant phytase of Claim 1, comprising the amino acid sequence of amino acids 31-440 of the sequence designated PHY850 or PHY902 of Figure 12.
17. The recombinant phytase of Claim 1, wherein said modification is a substitution and said substitution is at amino acid sequence position 113.
18. The recombinant phytase of Claim 17, further comprising a modification at one or more of the amino acid sequence positions selected from the group consisting of residues corresponding to residue 26, 43, 46, 54, 73, 126, 184, 228, 384, and 410 of a mature AppA phytase or of a natural variant thereof.
19. The method according to Claim 13, wherein said nucleic acid comprises a sequence selected from one of the sequences listed in Figure 21.